Technology in Massachusetts Schools

2004-2005

April 2006

Massachusetts Department of Education

address 350 Main Street, Malden, MA 02148
telephone 781-338-3000 **internet** www.doe.mass.edu

Massachusetts Department of Education

This document was prepared by the Massachusetts Department of Education
Dr. David P. Driscoll, Commissioner of Education

This report was prepared by:

Connie Louie, Director of Instructional Technology

Susan Hargrave, Instructional Technology Specialist

350 Main Street, Malden, Massachusetts 02148-5023 #781-338-3000
www.doe.mass.edu

Contents

Introduction

The connection between technology, globalization, and competitiveness has recently become a popular topic of conversation. In his best-selling book *The World Is Flat*, Thomas Friedman states, "Clearly, it is now possible for more people than ever to collaborate and compete in real time with more other people on more different kinds of work from more different corners of the planet and on a more equal footing than at any previous time in the history of the world—using computers, e-mail, networks, teleconferencing, and dynamic new software."[1]

Friedman and others have emphasized the importance of preparing America's youth to succeed in this flattened world. Secretary of Education Margaret Spellings, in her recent testimony to the U.S. Senate Committee on Health, Education, Labor, and Pensions, spoke of the unprecedented pace of technological innovation and global competition taking place today, concluding that "All Americans must be technically adept and numerically literate—regardless of their chosen occupation—so that they can make informed decisions and enjoy advancement in their careers."[2]

What can schools do to ensure that students will have the skills and knowledge they need to thrive in today's global economy? To answer this question, the Partnership for 21st Century Skills brought together business people, education leaders, and policymakers from across the nation in 2002 to begin defining a vision for 21st century education. The resulting publication, *Learning for the 21st Century*[3], stresses the importance of technology in education, stating, "Today's education system faces irrelevance unless we bridge the gap between how students live and how they learn . . .. Students will spend their adult lives in a multitasking, multifaceted, technology-driven, diverse, vibrant world—and they must arrive equipped to do so."

As this report will show, Massachusetts school districts are making progress in providing instruction that is relevant to today's students—and in preparing students for the technological demands of the 21st century. According to data submitted by districts, the use of technology in the classroom has increased, with an estimated 40% of teachers using technology on a daily basis. In addition, school leaders are addressing the issue of technology literacy for both students and teachers. Many school districts have developed tools to assess students' technology literacy, and an increasing number of districts are asking their teachers to use the state's Technology Self-Assessment Tool (TSAT)[4]. Moreover, in 2004-2005, districts reported an increase in teacher's technology literacy.

---

[1] Thomas L. Friedman, *The World Is Flat: A Brief History of the Twenty-first Century* (New York: Farrar, Straus, and Giroux, 2005), p. 8.

[2] Testimony of Margaret Spellings, Secretary, U.S. Department of Education, on the Role of Education in Global Competitiveness before the United States Senate Committee on Health, Education, Labor, and Pensions, February 9, 2006.

[3] *Learning for the 21st Century*, Partnership for 21st Century Skills (2003) is available online at http://www.21stcenturyskills.org/index.php?option=com_content&task=view&id=29&Itemid=42 .

[4] Information about the Technology Self-Assessment Tool is available online at http://www.doe.mass.edu/edtech/standards/sa_tool.html .

Even though progress has been made, much work remains to be done. There are still many teachers in Massachusetts who use technology only occasionally, if at all. There are also teachers and students who are not proficient with technology. In order to continue making progress in preparing students for a technology-driven world, schools must provide increased professional development in technology, sufficient support for the use of technology, and a robust technology infrastructure. This report will gauge the progress of districts in providing these prerequisites for effective technology use.

Teaching and Learning

"Increasingly, personal effectiveness and civic participation require an understanding of and proficiency with technology", the Partnership for 21st Skills states. "From finding advice on parenting and retirement plans to paying taxes and parking tickets to participating in public forums, competence with 21st century skills is a new basic."[5]

Technology Proficiency

Student Technology Literacy

The *Massachusetts Recommended PreK-12 Instructional Technology Standards* [6], published in 2001, define what students should know and be able to do in order to be considered technologically literate. These standards comprise three broad categories. Standard 1 includes proficiency in basic productivity tools as well as a conceptual understanding of technology systems. Standard 2 relates to understanding of ethics and safety issues in using electronic media. Standard 3 asks students to apply a wide range of technology tools to their learning of the curriculum. The standards recommend that students learn technology skills within the context of the curriculum, to enhance their learning of both the technology skills and the subject matter.

In 2004 the Department began collecting data from districts on the percentage of eighth grade students who are proficient in these standards. The data collection was expanded in 2005 to include students at three levels: grades 1 through 4, grades 5 through 8, and grades 9 through 12. Districts were also asked to report the percentage of students that fell into each of three categories: those who had mastered all or most of the standards, those who had mastered about half of the standards, and those who had mastered less than half of the standards. The results are shown in the table below.

[5] *The Road to 21st Century Learning: A Policymaker's Guide for 21st Century Skills*, Partnership for 21st Century Skills (2004) is available at http://www.21stcenturyskills.org/index.php?option=com_content&task=view&id=30&Itemid=32 .
[6] The *Massachusetts Recommended PreK-12 Instructional Technology Standards* are available at http://www.doe.mass.edu/edtech/standards/itstand.pdf .

Student Technology Literacy *Statewide Averages Based on District Reports*			
	Grade 4 students	**Grade 8 students**	**Grade 12 students**
Have mastered all or nearly all of the standards.	48%	56%	57%
Have mastered half or more than half of the standards.	33%	30%	29%
Have mastered less than half of the standards.	19%	14%	13%

The most common method used to determine students' levels of technology literacy, used by 41% of districts, was the use of a teacher survey. Districts also used methods such as informal interviews with staff or observations in their computer labs, and a number of districts used more than one method.

To obtain more specific data, 32% of districts assessed technology literacy at the individual student level, with half of the districts using a student survey and half of them using some kind of student assessment. For example, in Freetown-Lakeville, high school students were given a technology survey, which asked how often they used computers, which subjects they used them in, where they used computers, purposes for which they used computers, and how much help they needed using them.

In the districts that had formal assessments for student technology literacy, various approaches were used. Some districts incorporated the technology assessment into the district's technology curriculum. For example, in Williamsburg's elementary schools, teachers used technology-integrated curriculum projects developed by the district for each grade level, and technology literacy was assessed using rubrics. The Greenfield elementary schools also used curriculum-based projects to assess students' technology skills. However, instead of a rubric, the technology teacher kept a spreadsheet for each student, listing the skills mastered and skills to be learned. In the Greenfield Middle School, assessment was also incorporated into a ten-week technology course, which included a keyboarding unit, a research unit, and a curriculum-based animation unit. While timed tests and quizzes were used to assess students' keyboarding skills, rubrics were used to assess their technology-integrated projects.

For older students, some districts used self-assessments to measure technology literacy. For example, in Northampton, high school seniors take a web-based self-assessment similar to the TSAT used for teachers. In Hudson, eighth graders take a skills survey that

uses a four-point scale to find out how students feel about their mastery of the instructional technology standards. Students select one of four choices for each technology standard: (1) they don't know the skill, (2) they can do it with help, (3) they can do it independently, or (4) they can teach others to do it.

Interestingly, the districts that used student assessments tended to have higher levels of technology literacy than other districts, perhaps because they placed a greater emphasis on developing technology literacy. On average, the districts with technology assessments reported that 69% of twelfth graders had mastered all or nearly all of the Massachusetts technology standards, 71% of eighth graders had done so, and 52% of fourth graders had done so.

Teacher Technology Literacy

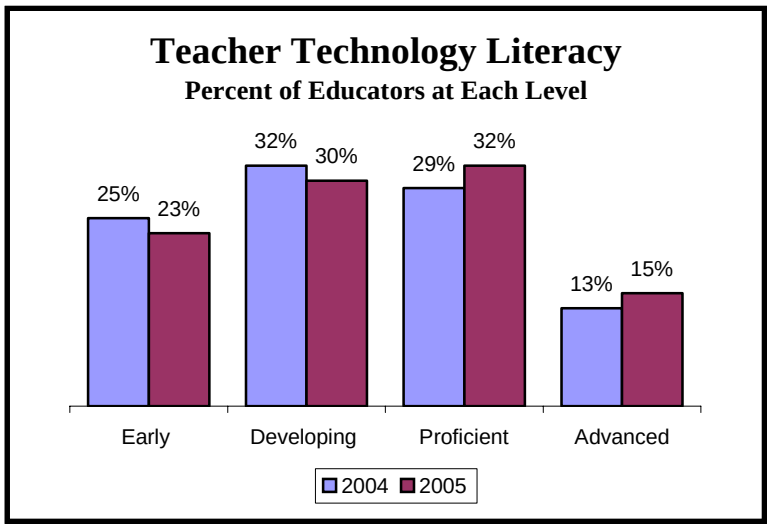
In order to help students become technologically literate, teachers also need to be knowledgeable about technology. To help teachers determine their own levels of technology proficiency and determine their need for professional development, the Department provides the online Technology Self-Assessment Tool (TSAT)[7], which is available on MassONE as an interactive tool, which aggregates teacher data, and a PDF file on the Department's web site. (In order to preserve the privacy of individual users, the MassONE TSAT reports only aggregated data, as opposed to data from individual teachers.)

Districts were asked to use either the TSAT application or their own methods. In 2005 66% of districts used either the TSAT or a locally developed survey aligned to the TSAT, a significant increase from the 50% that did so in 2004. Two-thirds of the districts used informal observation to gauge technology literacy, often in addition to another method like the TSAT.

The TSAT has four levels, each of which lists an average of 25 skills. The four levels were created to align with the levels in the Massachusetts STaR Chart[8], a tool that helps districts assess their readiness to use technology to improve student learning.

To take the TSAT, teachers begin at the lowest level (Early Technology), checking off the skills they know and progressing to the next level once they have mastered the skills at each level. A teacher's level is defined as the level where the teacher needs to stop and learn those skills. As the graph and table below illustrate, districts are showing progress in teacher technology literacy. The number of teachers who are at the Early Technology level has decreased, while the number at the Advanced level has increased. This is good news, because it means that more teachers will be able to help their students develop the 21st century skills they need.

[7] Information about the TSAT is available at http://www.doe.mass.edu/edtech/standards/sa_tool.html .
[8] The Massachusetts STaR (School Technology and Readiness) Chart is available at http://www.doe.mass.edu/boe/sac/edtech/star.html .



Teacher Technology Literacy *Percent of Educators at Each Level*		
Level	**2004**	**2005**
Early technology	25%	23%
Developing technology	32%	30%
Proficient	29%	32%
Advanced	13%	15%

Use of Technology

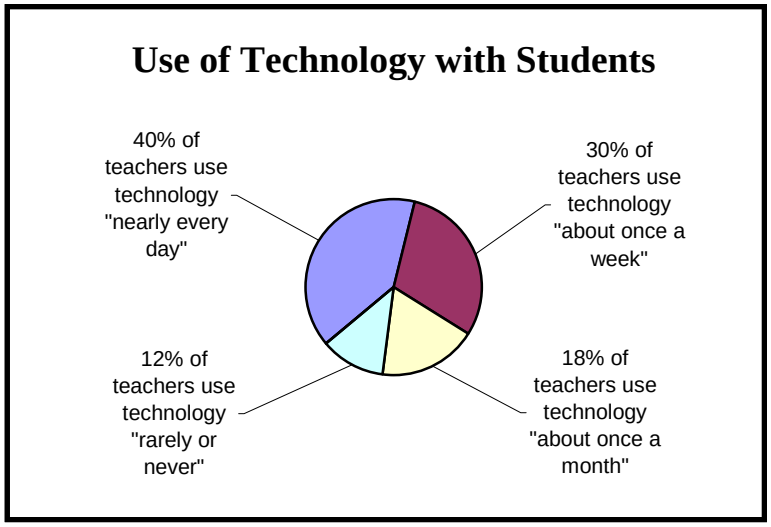
The National Technology Plan states, "Technology ignites opportunities for learning, engages today's students as active learners and participants in decision-making on their own educational futures and prepares our nation for the demands of a global society in the 21st century"[9]. These are a few of the reasons that the Department's technology guidelines recommend that at least 85% of teachers use technology each week with their students.[10]

[9] *Toward A New Golden Age In American Education: How The Internet, The Law And Today's Students Are Revolutionizing Expectations* (National Education Technology Plan 2004), p. 46. Complete text of the plan is available at http://www.nationaledtechplan.org/ .

[10] The *Local Technology Plan Guidelines (School Year 2004-2005 through 2006-2007)* are included in the Appendix of this report.

At School

According to the data submitted by districts, the percentage of teachers using technology with their students "about once a week" or more was about 70%, nearly the same in 2004. The percentage of teachers using technology on a daily basis with students appears to have increased, from 37% to 40%. To gauge technology use, 36% of district's used the Department's Teacher Technology Use Survey[11], while other districts used methods such as local surveys, informal observation, and logs from computer labs. Interestingly, the level of technology use was about the same for the districts that used the Department's survey and those that did not.

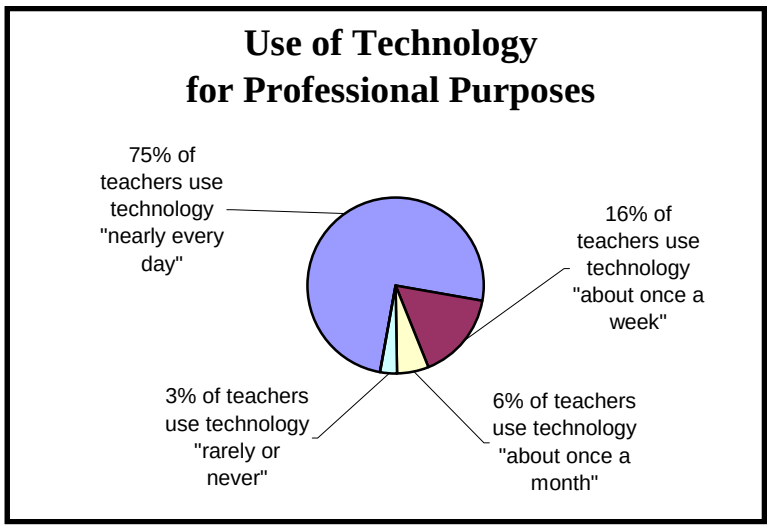


Use of Technology with Students *Statewide Averages Based on District Reporting*	
Frequency	**Percent of teachers**
Used technology nearly every day	40%
Used technology about once a week	30%
Used technology about once a month	18%
Use technology rarely or never	12%

The Department's guidelines also recommend that at least 85% of teachers use technology outside the classroom every day for professional purposes such as lesson

[11] The Teacher Technology Use Survey is available at http://www.doe.mass.edu/edtech/techplan/ .

planning, administrative tasks, communications, and collaboration. District data for 2005 show that 75% of teachers used technology professionally every day, up from 67% last year. Again, there was very little discrepancy in the data from districts that used the teacher survey and the data from those that didn't.

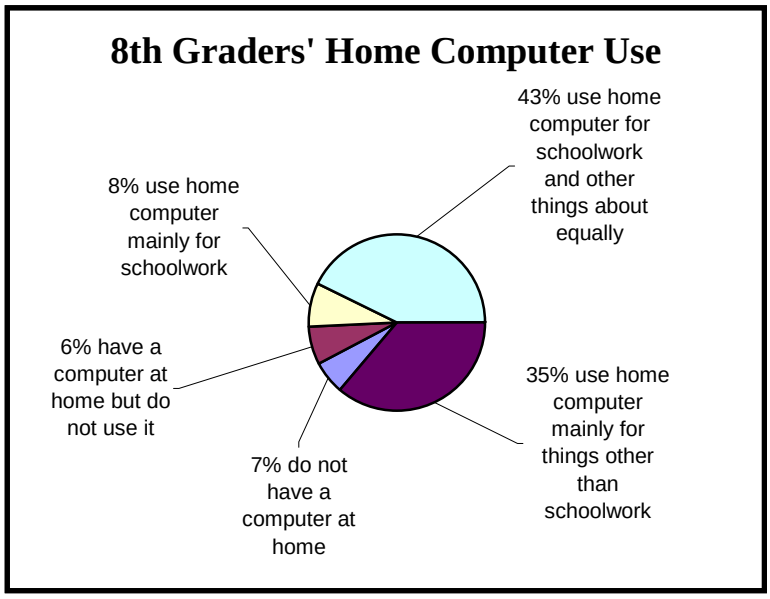


Use of Technology for Professional Purposes *Statewide Averages Based on Districts' Estimates and Surveys*	
Frequency	**Percent of teachers**
Used technology nearly every day	75%
Used technology about once a week	16%
Used technology about once a month	6%
Used technology rarely or never	3%

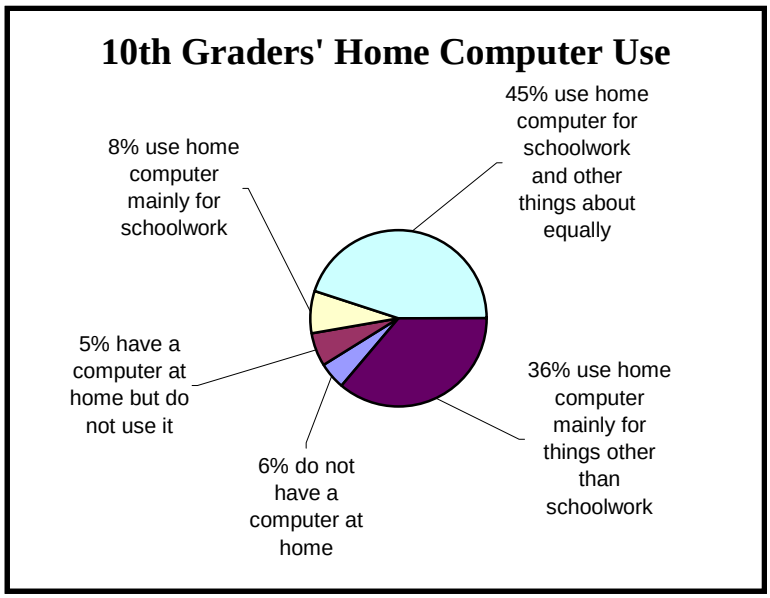
At Home

It is useful to know whether students use computers outside of school. Home use of computers is likely to affect students' overall proficiency with technology, as well as their feelings about the use or lack of use of technology in their schools. As part of a questionnaire distributed with the MCAS tests, eighth and tenth grade students were asked to describe their use of computers at home. The question was answered by 70,339 eighth graders and 62,265 tenth graders. Student selected from one of five choices describing their home computer use, as shown in the graphs and tables below.

Interestingly, just 13% of eighth graders and 11% of tenth grades do not use a computer at home. In addition, more than 50% of students in both groups use computers at home for schoolwork.



8th Graders' Home Computer Use	
Possible responses	**Percent of students**
Do not have a computer at home	7%
Have a computer at home but do not use it	6%
Use home computer mainly for schoolwork	8%
Use home computer mainly for things other than schoolwork	35%
Use home computer for schoolwork and other things about equally	43%



10th Graders' Home Computer User	
Possible Responses	**Percent of students**
Do not have a computer at home	6%
Have a computer at home but do not use it	5%
Use home computer mainly for schoolwork	8%
Use home computer mainly for things other than schoolwork	36%
Use home computer for schoolwork and other things about equally	45%

E-Learning

E-learning offers rich opportunities to engage today's students and ultimately improve their learning. In addition, the Internet makes it possible to provide students with courses and resources that might not otherwise be available. In 2005 the Department published *E-Learning in Massachusetts*[12], which offers descriptions of some of the online learning activities currently underway in schools across the state. In addition to online courses, the report describes a variety of other online activities such as teleconferences, collaborative projects, discussion forums, Internet research, and use of interactive online resources.

[12] *E-Learning in Massachusetts*, published by the Massachusetts Department of Education in 2005, is available at http://www.doe.mass.edu/edtech/news05/eLearning.html .

Most schools appear to be involved in some types of online learning activities; however, the number of districts offering entire courses online is much smaller. Districts' use of distance learning courses for students was about the same in 2005 as in 2004, with 24% of districts reporting that their students took such courses in 2004-2005. Online professional development, discussed in the professional development section of this report, is more prevalent, although it decreased slightly over the past year, with 56% of districts reporting some use of it in 2004-2005.

Teachers of online courses and workshops appear to be concentrated in a relatively small number of districts. Just 16% of districts reported that one or more of their teachers taught students online. In more than three-quarters of these districts, teachers taught students outside the district, while in about two-thirds of the districts, teachers taught students online in their own district.

Similarly, 13% of districts reported that one or more of their educators taught online professional development courses or workshops. In contrast to the data for teaching students online, three-quarters of these districts reported that staff taught their colleagues within the district, whereas just over than half of them reported staff teaching educators in other districts.

Internet Safety

Although the Internet opens the door to a world of resources that can enhance learning, the online world also presents risks. Schools need to help keep students safe from online perils such as predators, hate groups, cyberbullies, and inappropriate content. In addition, the growing use of online social networks provides another reason to teach students about safe, responsible, and ethical use of the Internet. Although students may be technically adept at creating personal web pages, they may need help in understanding that the Internet has an enormous audience, which may include potential employers, as well as people who might want to do them harm.

The *Massachusetts Recommended PreK-12 Instructional Technology Standards*[13] include safety issues at every grade span. According to district reports, 93% of schools provided formal instruction for students about the responsible use of technology, including ethics and safety issues. To ensure that staff are able to provide this instruction to students, 85% of schools offered similar instruction for staff.

To assist schools in educating students about Internet safety, the Department has made available interactive, age-appropriate activities from NetSmartz, an educational safety resource from the National Center for Missing & Exploited Children (NCMEC) and the Boys & Girls Clubs of America. Districts can download these materials from the Teaching and Learning Resources (TLR) folder on MassONE.

[13] The *Massachusetts Recommended PreK-12 Instructional Technology Standards* are available at http://www.doe.mass.edu/edtech/standards/itstand.pdf .

Schools that apply for state and federal grants must protect students by complying with the Children's Internet Protection Act (CIPA).[14] The law requires schools to certify that they have an Internet safety policy and that they are using filtering to block visual images that are obscene, child pornographic, or harmful to minors. In 2005, more than 99 % of schools had such filters.

An important component of a district's Internet safety policy is an Acceptable Use Policy (AUP) spelling out exactly what students should and should not do when using the Internet. According to district reports for 2004-2005, 99% of schools have such as policy for students and 94% have one for staff. However, just having a policy is not enough; students and staff need to know about the policy and understand it so that they will comply with it. One way to increase awareness of the AUP is to include it on the district or school web site, which 88% of Massachusetts districts have done. Another way is to include it in the student handbook, which 87% of districts have done.

Use of MassONE

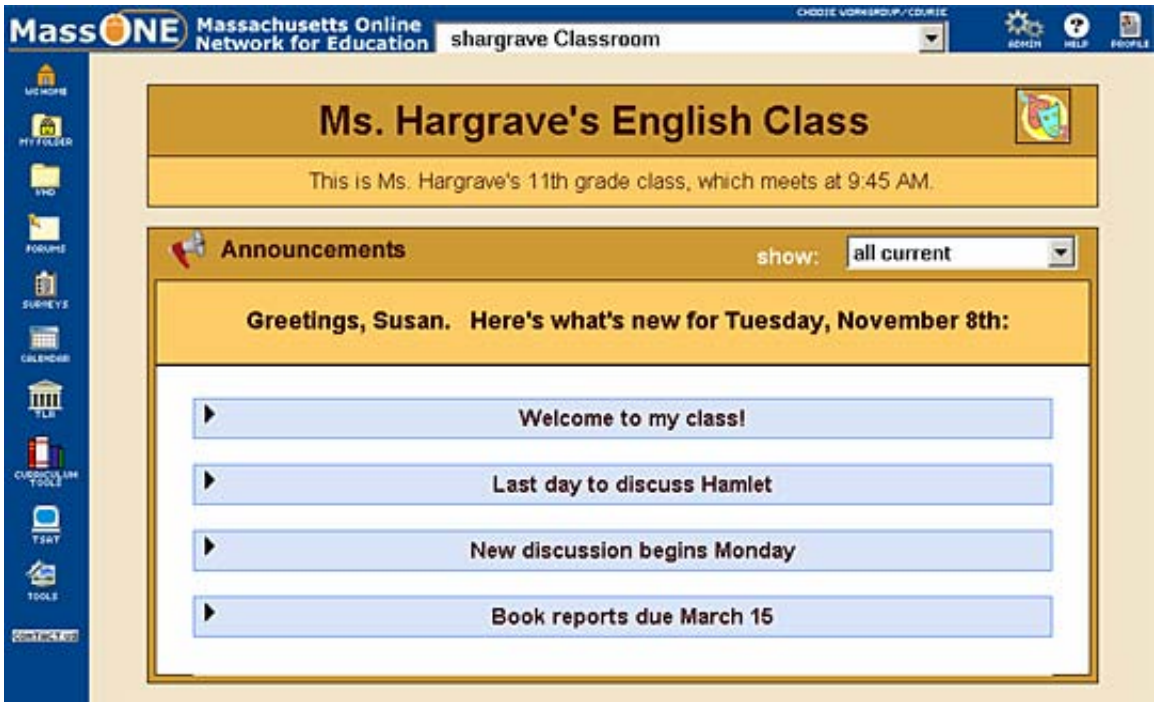
In 2005, the state's education portal was redesigned and relaunched as the Massachusetts Online Network for Education (MassONE)[15]. The new name reflects the state's vision for a system that enables communication, collaboration, and sharing among students, teachers, and administrators.

As part of its redesign, MassONE has been structured around secure learning communities, called workgroups. After logging in to MassONE, users select a workgroup to interact with, using the dropdown menu at the top of the screen. They then see the workgroup's main page, which contains all of the announcements for that workgroup. From there, users simply click an icon to go directly to the workgroup's discussion forum, Virtual Hard Drive, or calendar. Members of the workgroup can share ideas and resources, and only members of the group will be able to view them.

MassONE allows educators to create their own secure workgroups for classes that they teach. Schools and districts can also set up workgroups for teacher collaboration or study groups. Organizations can set up workgroups with members across the state for special projects such or online courses. An online workgroup creation tool makes it easy for educators to create and customize a home page for the workgroup.

[14] Further information about CIPA is available from the Federal Communications Commission's web site at http://www.fcc.gov/cgb/consumerfacts/cipa.html .

[15] MassONE can be accessed at http://massone.mass.edu/ . To use MassONE's tools and resources, educators and students need to register for a MassONE account.



Over the past year, MassONE introduced two new tools that can be used in online instruction: the survey tool and the dropbox. The survey tool allows educators to quickly construct online surveys, quizzes, or tests. The dropbox allows students to securely submit homework to their teacher while keeping it out of view of the other students. These new tools, used in combination with the discussion forums, Virtual Hard Drive, and calendar, offer a useful environment for online courses and professional development workshops.

MassONE has also introduced a collection of curriculum tools. The collection includes a lesson plan tool where teachers can enter information such key concepts, activities, and assessment strategies. The lesson plan tool links to a standards database, which allows teachers to quickly identify the standard(s) that a lesson will focus on. In addition, through MassONE's collaboration with WIDE World, developed at the Harvard Graduate School of Education, teachers also have access to WIDE World's Collaborative Curriculum Design Tool (CCDT). The CCDT is a web application that supports the development and dissemination of lesson plans and curriculum units that foster student learning through the application of the Teaching for Understanding Framework.

Use of MassONE continues to grow, with 91,017 user accounts as of March 2006. This represents a 63% increase over the past year. Currently 44% of the accounts are held by educators, while 56% are held by students. MassONE continues to be used for collaboration and sharing in the Department-sponsored summer institutes for teachers, with 24 institutes using it in 2005 and 32 institutes preparing to use it in 2006.

Data-driven Decision Making

Technology can play a crucial role in collecting, managing, and analyzing data, which can then be used to make decisions about instructional practices that will better meet students' needs. No Child Left Behind has encouraged states and school districts to make use of data systems to support high quality targeted instruction by providing cost-effective, timely, information to educators.

As a result, the Department is piloting a statewide Educational Data Warehouse and Reporting System for use by district and Department staff. The pilot involves 35 districts, which were selected and funded through the Title IID Technology Enhancement Competitive Grants Program. The Department is loading four years of SIMS and MCAS data into the system for the pilot districts. Beginning this summer, the pilot districts will be able to use the system's web-based tools to analyze and generate reports by using the data.

In addition, seven of the participating districts will upload a limited set of their own data into the system, including things like local assessment data, student grades, and staff data. Doing this will enable the districts to generate reports correlating their local data to SIMS and MCAS. For example, the districts will be able to find out if students' MCAS scores are related to scores on local assessments, as well as to the students' grades. Districts will also be able to select cohorts of students, such as low-income students or limited English proficient students, and follow their academic progress over time.

The purpose of the pilot is to determine whether a statewide data warehouse is feasible and useful. Meanwhile, the Department is working actively with the Governor's Office and the Legislature to secure funding for a statewide license, allowing all public school educators and policy makers in the Commonwealth to access the data warehouse. The long-term goal of the pilot is to provide a powerful, standardized, and user-friendly system for reporting and analyzing educational data to all Commonwealth school districts, at a substantially reduced cost.

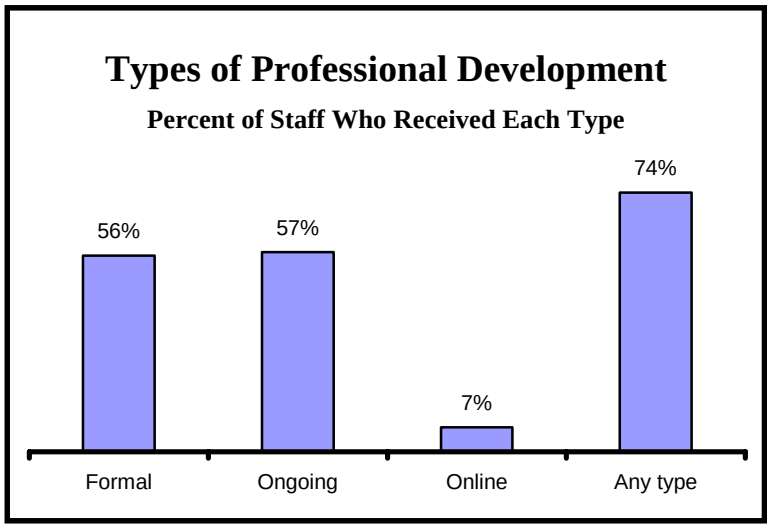
Educator Professional Development

According to numerous studies, technology is likely to impact student learning only when teachers receive adequate and appropriate professional development[16]. Because professional development is so important, the Department of Education encourages districts to apply the NCLB guideline to all of their technology spending, allocating a minimum of 25% of their technology budget (including funds from all sources) for professional development.

Massachusetts districts are addressing the need for technology professional development, reporting, on average, that 74% of their teachers received some type of technology training in 2004-2005. Moreover, the percentage of teachers receiving technology professional development has increased by 13 percentage points since 2002-2003.

Types of Professional Development

Districts indicated that slightly more than half of their teachers received formal professional development such as technology workshops, summer institutes, credit courses, or study groups. In addition, slightly more than half of the teachers received ongoing professional development such as coaching, mentoring, and co-teaching. These data suggest that many teachers received both formal and informal technology professional development, which is in line with the Massachusetts State Plan for Professional Development's recommendation that professional development provide "on-the-job, informal support throughout the school year."



[16] From *The Learning Return on Our Educational Technology Investment: A Review of Findings from Research*, WestEd, 2002; available at http://www.wested.org/online_pubs/learning_return.pdf .

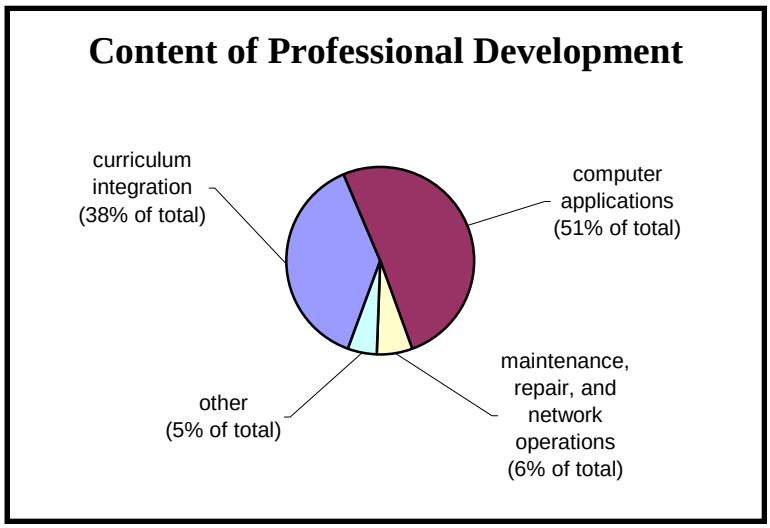
Types of Professional Development Received	
Professional development type	**Percent of staff who received it**
Formal professional development	56%
Ongoing professional development	57%
Online professional development	7%
Any type of professional development	74%

Online programs make it possible for educators to receive professional development on a schedule that is convenient to them. Although the percentage of districts making use of online professional development was about the same as last year (69% of districts), the percentage of teachers in those districts who took part in online courses increased. In 29% of the districts using online courses and workshops, at least 10% of the staff participated. Moreover, in 12% of districts, teacher participation ranged from 20% to 100%.

Content of Professional Development

On average, districts reported that 51% of their professional development focused on computer applications in 2004-2005, which included topics such as productivity tools, presentation tools, and Internet resources and tools. This category also included the use of equipment such as scanners, digital cameras, video cameras, and handheld computers. An important topic included under computer applications is the use of assistive technologies. In an effort to provide access to the curriculum for all students, 61% of districts provided professional development on assistive technology.

Integrating technology into the curriculum accounted for an average of 38% of districts' professional development. In addition to the topics that make up the Massachusetts Curriculum Frameworks, this category includes the Massachusetts Recommended Pre-K-12 Instructional Technology Standards, which 57% of districts covered in their professional development. Also included in this category is the use of technology for assessment. To help teachers better track student learning, 47% of districts provided professional development on assessment.



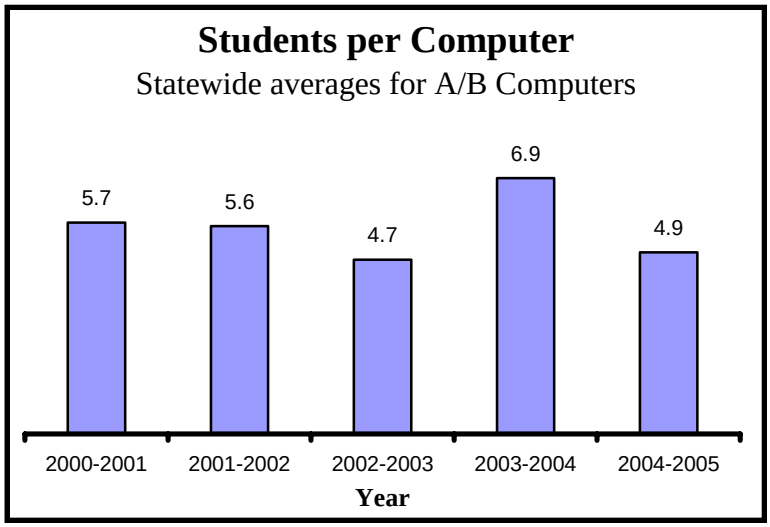
Content of Professional Development	
Category	**Percent of professional development**
Computer applications	51%
Curriculum integration	38%
Maintenance, repair, and network operations	6%
Other	5%

Infrastructure for Technology

In order to support teachers as they prepare students for the 21st century, districts need to provide a robust technology infrastructure and ensure its reliability to maximize educational uptime. In Massachusetts, districts can use the Department's technology guidelines to assess their performance in these areas.[17]

Computers

The Department's guidelines recommends that districts maintain a ratio of fewer than five students per high-capacity Internet-connected computer. The Department updated the definition of a high-capacity computer in 2004,[18] causing the statewide ratio of students to high-capacity computers to rise to 6.9 in 2004. In 2005, the ratio dropped to 4.9, which indicates that school districts are purchasing new computers to replace older models.

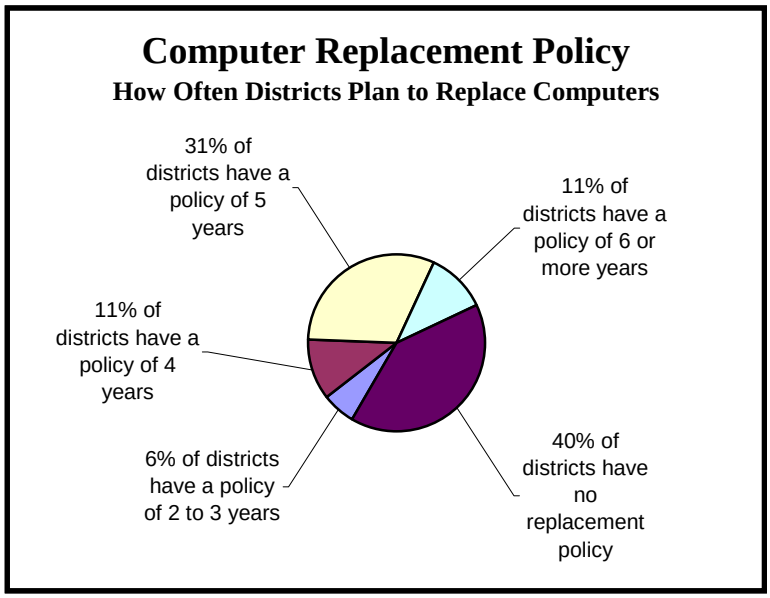


[17] The *Local Technology Plan Guidelines (School Year 2004-2005 through 2006-2007*) are included in the Appendix of this report.

[18] "High-capacity computers" were defined as "multimedia computers capable of running most software except for the latest video and graphics programs" and having from 128 to 256 MB RAM and a Pentium 3 processor or Macintosh G3 processor (or equivalent).

Students per Computer *Statewide Averages for A/B Computers*	
School year	**Ratio of students to computers**
2000-2001	5.7
2001-2002	5.6
2002-2003	4.7
2003-2004	6.9
2004-2005	4.9

The rise and fall of computer ratios illustrates the importance of having a computer replacement policy, which allows a district to plan for the expenditures needed in order to provide current technology. The percentage of districts that have such a policy has risen over the past year from 51% to 61%. The average replacement cycle for those districts was 4.8 years.

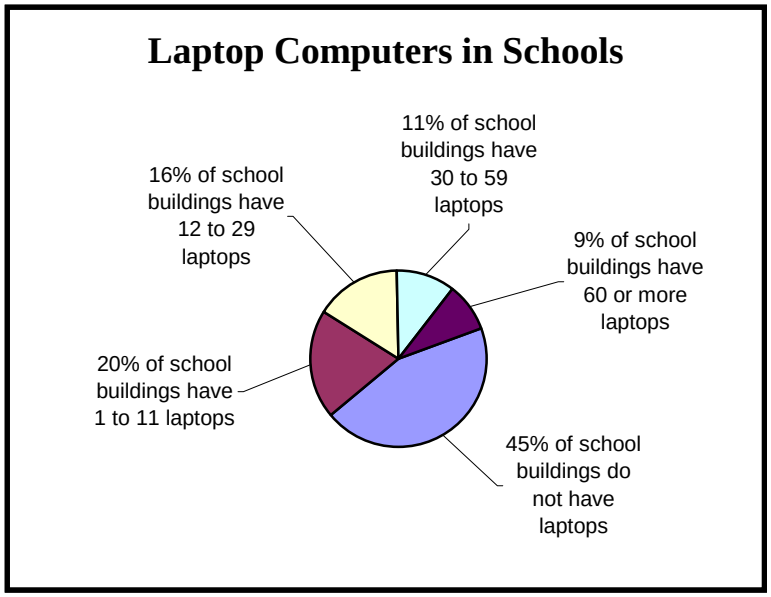


Computer Replacement Policy *How Often Districts Plan to Replace Computers*	
Replacement cycle	**Percent of districts**
2 to 3 years	6%
4 years	11%
5 years	31%
6 or more years	11%
do not have a policy for replacement	40%

Laptop Computers

The use of laptop computers continues to grow, with an increase of nearly 12% in the number of instructional laptops in use across the state. As the graph and table below illustrate, 55% of school building have at least one instructional laptop computer.

Many schools are investing in "mobile laptop labs," using carts that can be moved from room to room, securely storing and charging the computers when they are not in use. In 2004-2005, 20% of school buildings were equipped with 30 or more laptop computers, making it possible to equip one or more classroom at a time with laptops. In 2005-2006, six districts received funding through the Technology Enhancement competitive grant program to pilot the use of laptop labs in their schools.



Laptop Computers in Schools	
Number of laptops in school	**Percent of school buildings**
none	45%
1 to 11	20%
12 to 29	16%
30 to 59	11%
60 or more	9%

Several districts have been pioneering "24/7" one-to-one wireless laptop environments, in which every student has a personal laptop to use at school and at home. Six years ago, the Gateway School District (a regional system made up of seven rural towns) chose to implement a student laptop initiative that has grown to include grades 3-12. Gateway uses district-owned laptops in grades 3 through 6, while making available low-cost family leases or purchases in grades 7 through 12. Last year the state-funded Berkshire Wireless Learning Initiative (BWLI) was launched, with the goal of transforming teaching and learning. This pilot program is being developed to evaluate a one-to-one approach using laptop computers and wireless communication in middle schools in North Adams and Pittsfield.

Assistive Technologies and Universal Design

Technology offers many ways to assist students with disabilities, including learning disabilities, as well as students whose first language is not English.[19] For example, text-to-speech software allows students to hear text read on the computer. According to district reports, text-to-speech software is available in 63% of school buildings.

Awareness of the importance of universal design and accessibility continues to be high, with 97% of schools reporting that they consider accessibility for all students when purchasing technologies. The availability of universally designed software also remains high. Defined as software with built-in features making it accessible to all students, universally designed software was available in 85% of school buildings in 2005. In addition, 90% of schools have hardware, such as scanners, that can be used to digitize printed materials for students who need to use text-to-speech software.

An increasing number of students with disabilities have been using assistive technologies to take the MCAS. Guidelines for the use of assistive technologies in taking the MCAS are spelled out in the Department's publication *Requirements for the Participation of*

[19] For more information, see the *Assistive Technology Guide for Massachusetts Schools*, available at http://www.doe.mass.edu/edtech/toolkit/students/ATguide.pdf .

Students with Disabilities in MCAS.[20] The most commonly used technology-based accommodations involve use of word processors for students who have difficulty writing and the use of text-to-speech software for students who have difficulty reading. In 2005, the greatest use of word processing software was on the ELA Composition test, as shown in the table below. The greatest use of text-to-speech software was on the Mathematics test, followed by the ELA Composition test.

Use of Assistive Technology on the MCAS

Number of Students Using the Accommodation

MCAS Test	Word processor	Text-to-speech
ELA-Composition	5044	318
ELA-Reading or Language and Literature	3285	175
Mathematics	3076	327
Science and Technology/ Engineering	1189	111

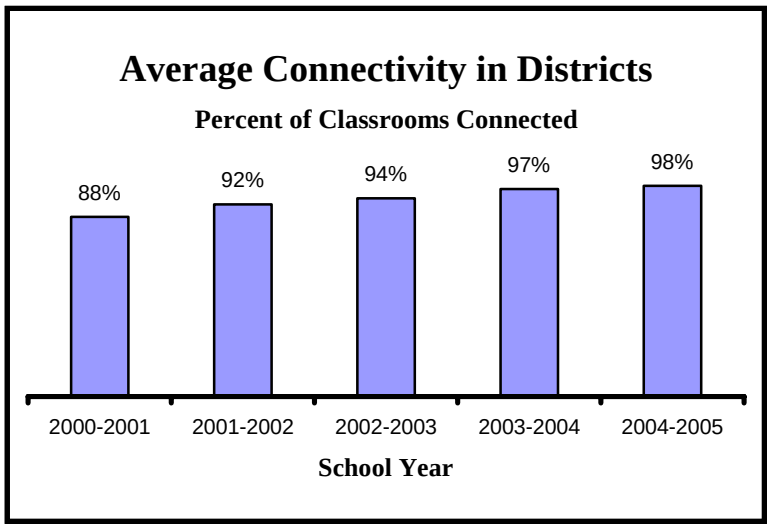
For students with significant disabilities, the Department offers the option of submitting the MCAS Alternate Assessment (MCAS-Alt),[21] which involves compiling a portfolio throughout the school year. Since 2000, schools have been permitted to submit electronic portfolios in place of paper portfolios. An electronic portfolio can include, for example, digital video or audio clips of the student completing various tasks, scanned samples of student work, and student work samples created on a computer. To assist educators in creating and organizing electronic portfolios, the Department offers downloadable software, training, and support for teachers to use the MCAS-Alt Electronic Version (EV). In 2005, electronic portfolios were submitted for 600 students, a substantial increase over the 450 submitted in 2004.

Connectivity

Districts continue to make progress in connecting their classrooms to the Internet. In 2005, the average district had 98% of its classrooms connected and 97% of its computers connected to the Internet. In addition, 82% of districts reported that all of their classrooms were wired, which is up from 79% in the previous year.

[20] *Requirements for the Participation of Students with Disabilities in MCAS* is available at http://www.doe.mass.edu/mcas/alt/spedreq.pdf .

[21] Further information about the MCAS Alternate Assessment is available at http://www.doe.mass.edu/mcas/alt/ .

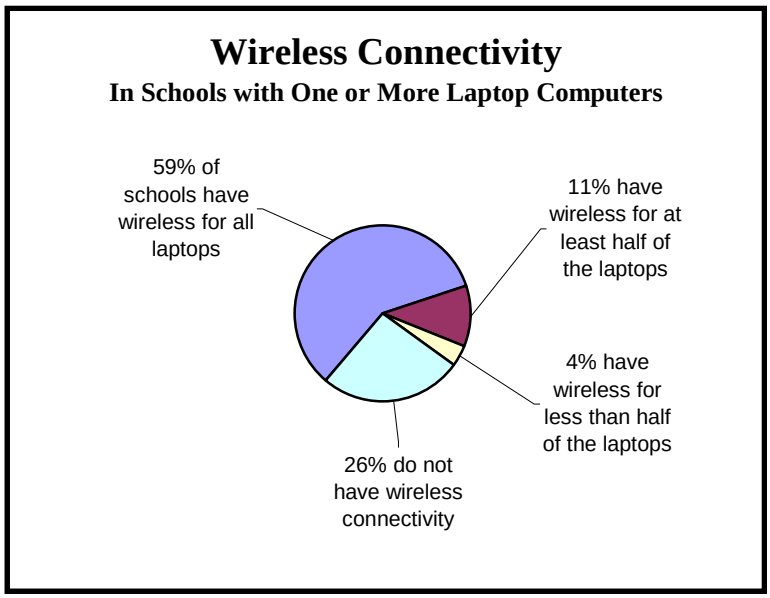


Average Connectivity in Districts	
School Year	**Percent of classrooms connected**
2000-2001	88%
2001-2002	92%
2002-2003	94%
2003-2004	97%
2004-2005	98%

Wireless

With an increased number of laptop computers in schools, the use of wireless connectivity has also grown. In 2004, 692 school buildings had wireless connectivity, while in 2005, 785 (or 43% of the total schools reporting) had wireless.

Wireless was more common in schools that had at least one laptop computer. Of the 1008 school buildings with laptops, 74% of the buildings had wireless connectivity. In addition, as the graph and table below illustrate, 59% of the buildings with laptop computers offered wireless connectivity for all of the laptops.



Wireless Connectivity *In Schools with One or More Laptop Computers*	
Laptops connected wirelessly	**Percent of schools**
All laptops	59%
At least half of all laptops	11%
Less than half of all laptops	4%
Do not have wireless	26%

Administration and Support Services

Technology Planning

Developing a technology plan can help a school district clarify its goals and focus its efforts so that it can best leverage technology to improve student achievement. The plan should focus on both long-term and short-term goals, all of which are aligned with the district's mission, its school improvement plan, the state's education goals, and the goals of No Child Left Behind. The Department's technology guidelines provide recommendations that can help districts in developing their technology plans.[22]

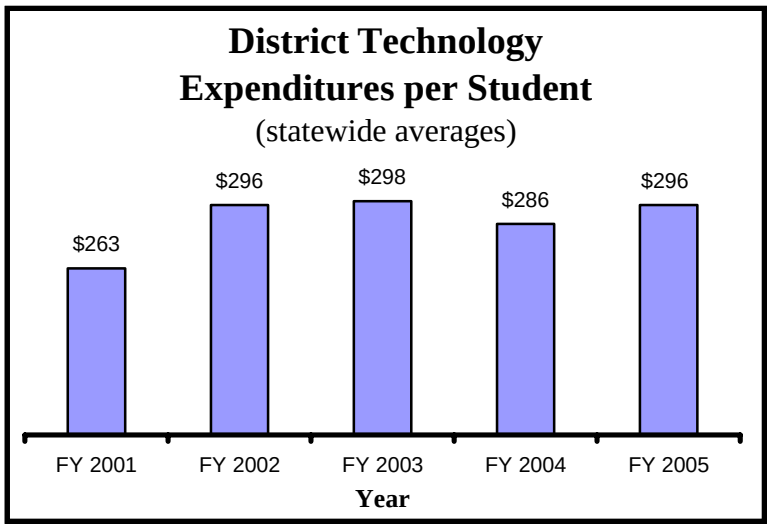
A state-approved technology plan is a requirement for eligibility for technology grants and E-rate discounts. To receive approval from the Department, a district needs to first develop a three- to five-year plan, which should then be posted on the district web site. Then the district must submit data to the Department annually to validate its implementation of the plan. For the school year 2004-2005, 93% of districts submitted data about their progress in implementing their technology plans. Most of these districts have posted their technology plans on their web sites so that the Department and others can review them.

The Department's technology guidelines incorporate the requirements for the federal E-rate discount program.[23] In order for a district to be eligible for E-rate, its technology plan must meet five requirements: (1) clear goals and a realistic strategy for using telecommunication and information technology to improve education; (2) a professional development strategy to ensure that staff know how to use these new technologies; (3) an assessment of the telecommunication services, hardware, software, and other services that will be needed; (4) a sufficient budget to acquire and support the non-discounted elements of the plan; (5) an evaluation process that enables the district to monitor progress toward the specified goals.

Technology Budget

In planning for technology, it is important to take into account all of the costs associated with the use of technology. In addition to computers, the budget needs to include funds for items such as administration, maintenance, upgrades, technical support, data management, and professional development. In 2004-2005 the average per student spending on technology was $296, a 3% increase from 2003-2004. These expenditures include monies from districts' operational budgets, municipals bonds, and grants from federal, state, local, and private sources.

[22] The *Local Technology Plan Guidelines (School Year 2004-2005 through 2006-2007)* are included in the Appendix of this report.
[23] Further information on E-rate is available at http://www.fcc.gov/learnnet/ .



District Technology Expenditures per Student *Statewide Averages*	
Year	**Average expenditure**
FY2001	$263
FY2002	$296
FY2003	$298
FY2004	$286
FY2005	$296

Providing funding for technology can be challenging, especially in times when budgets are tight. The Massachusetts STaR Chart[24] recommends that districts leverage federal, state, and private resources to supplement local funding for their technology efforts. Most districts took advantage of the federal funding available for technology. For the 2004-2005 school year, through No Child Left Behind's Enhancing Education Through Technology program (Title IID), approximately $5.2 million was available for entitlement grants, and an additional $5.2 million was available for competitive grants. A total of 383 districts applied for and received entitlement grants. In addition, the following competitive grants were awarded: 19 Technology Enhancement Competitive Grants, 25 Model Technology Integration Grants, 14 technology-integrated Summer

[24] The Massachusetts STaR (School Technology and Readiness) Chart is available at http://www.doe.mass.edu/boe/sac/edtech/star.html .

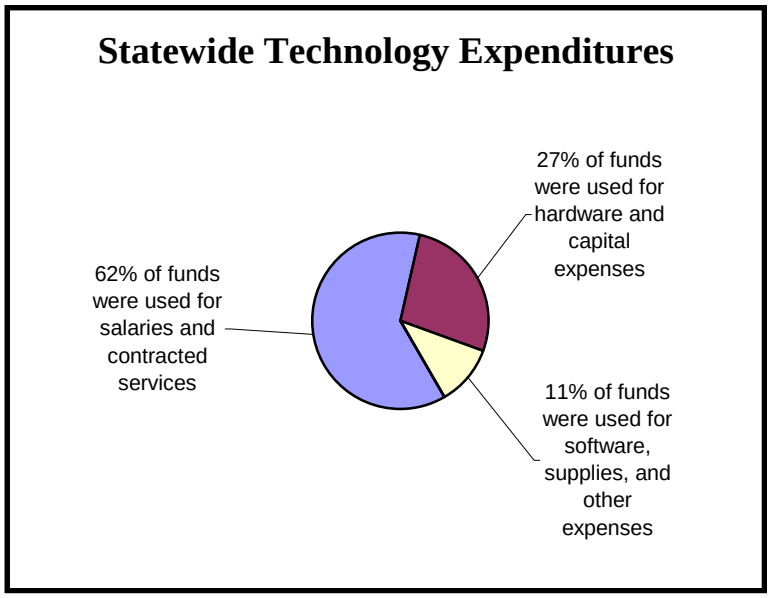
Content Institute Grants, and 3 Assistive Technology Summer Institute Grants. Many of these grants included partner districts, increasing the total number of districts.[25]

Districts continue to recognize the value of the federal E-rate[26] discount program; 80% of the districts that submitted data used it in 2004-2005. In 2004-2005 Massachusetts school districts received approximately $25 million in E-rate discounts for technology expenditures such as Internet services, telecommunications, and wiring. With discounts based on economic disadvantage and location (urban or rural), some Massachusetts districts are eligible for discounts as high as 90%. The average discount for Massachusetts districts was 60 %.

Staffing for Technology

Staffing is critical to the successful utilization of technology. However, one of the greatest challenges school districts face in the area of technology is providing funds for sufficient staffing. Aggregated data from districts shows that staffing and contracted services account for 62% of technology spending across the state.

When funds become tight, districts often find it necessary to reduce their staffs. However, without adequate staffing for technology leadership, curriculum integration support, technical support, and data management, teachers will be unable to use technology effectively. As a result, students may not develop the 21st century skills that they need in order to succeed as productive members of society.



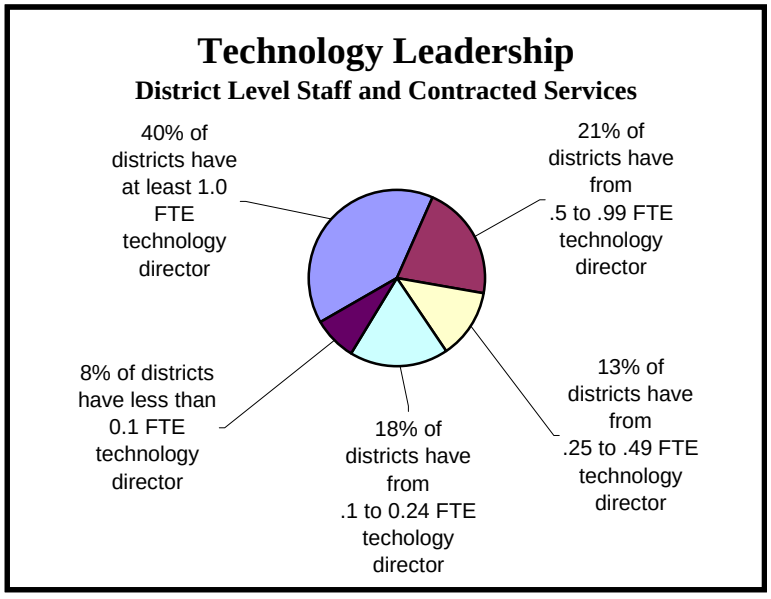
[25] Information on grants, including descriptions of funded projects, is available at http://www.doe.mass.edu/edtech/grants.html .
[26] For more information on E-rate, see http://www.fcc.gov/learnnet/ .

Statewide Technology Expenditures	
Expenditure category	**Percent of funds expended**
Salaries and contracted services	62%
Hardware and capital expenses	27%
Software, supplies, and other expenses	11%

Leadership

Using technology well is complex, because it involves many people and resources. An effective leader can help focus and coordinate the district's technology efforts to meet the needs of students and teachers. To do so, this leader needs to assess the district's technology needs, clarify its goals, develop implementation strategies, evaluate progress towards the goals, and make recommendations for the future.

Because of the complexities involved in using technology effectively, the Department's technology guidelines recommend that every district have a full-time district-level technology director or coordinator. As the graph and table below illustrate, just 40% of districts have at least one full-time district level technology director. Moreover, 7% of those districts used contracted services to reach the level of one full-time director.

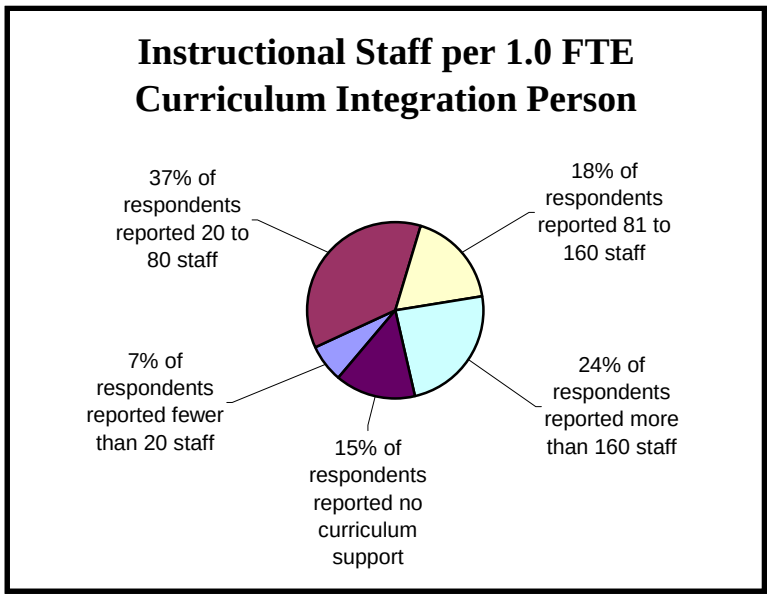


Technology Leadership *District Level Staff and Contracted Services*	
Level of staffing	**Percent of districts**
At least 1 FTE	40%
From .5 to .99 FTE	21%
From .25 to .49 FTE	13%
From .1 to .24 FTE	18%
Less than .1 FTE	8%

Curriculum Integration Support

Since technology changes quickly and the number of available resources is immense, it is important for teachers to receive support. The people usually responsible for curriculum integration support are instructional technology specialists, media specialists, and library teachers. The support they provide typically includes researching, locating and evaluating curriculum resources, identifying effective practices that incorporate technology, and providing professional development. In addition, these people may take the responsibility for ensuring that teachers and students meet the instructional technology standards. To carry out all of these functions, the curriculum integration person's activities may include consulting with teachers, modeling effective teaching with technology, collaborating with teachers to develop appropriate, technology-rich lessons, and providing workshops on technology integration.

To help teachers integrate technology into their teaching, the Department's technology guidelines recommend that schools have at least one full-time-equivalent person to support up to 80 teachers. Currently 44% of districts meet this recommendation for curriculum integration support, a substantial increase from last year's 32%. On the other hand, 39% of the districts either had no support or had a full-time-equivalent person supporting more than 160 teachers, still an improvement as compared to 2004. However, curriculum integration staff often have multiple responsibilities, so it can be difficult for districts to accurately determine the portion of time that is devoted specifically to curriculum integration support.



Instructional Staff per 1.0 FTE Curriculum Integration Person	
Staff supported by 1.0 FTE	**Percent of districts**
Fewer than 20 staff members	7%
20 to 80 staff members	37%
81 to 160 staff members	18%
More than 160 staff members	24%
Has no curriculum support	15%

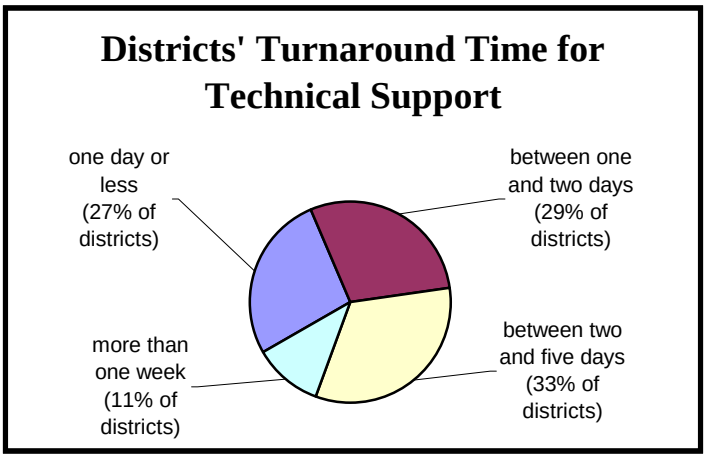
Technical Support

As the national technology plan points out, districts need to provide adequate technical support in order to "maximize educational uptime and plan for future needs." The Department's technology guidelines recommend that districts have the equivalent of one full-time position (which can include contracted services) to support every 200 computers. In 2005, 26% of districts reported having this level of support, a slight increase over the 24% that did so in 2004.

On average, according to district data, a technical support person maintains approximately 413 computers, down from 451 in 2004. Having an effective system for reporting, tracking, and fulfilling service requests is essential when a small staff is responsible for hundreds of computers. Districts used various methods to provide

support. The most widely used method was email support, which was used in 86% of districts, followed by telephone support, used in 74% of districts. Also, 39% of districts used an online self-help system, which can reduce the demands on the technical staff. An additional 6% of districts reported using contracted services to provide technical support.

According to district reports for 2004-2005, it took an average of 3.4 days to resolve a technical problem, which was slightly longer than in the previous year. However, 27% of districts estimated that they were able to resolve technical problems in one day or less, a slight increase over last year.

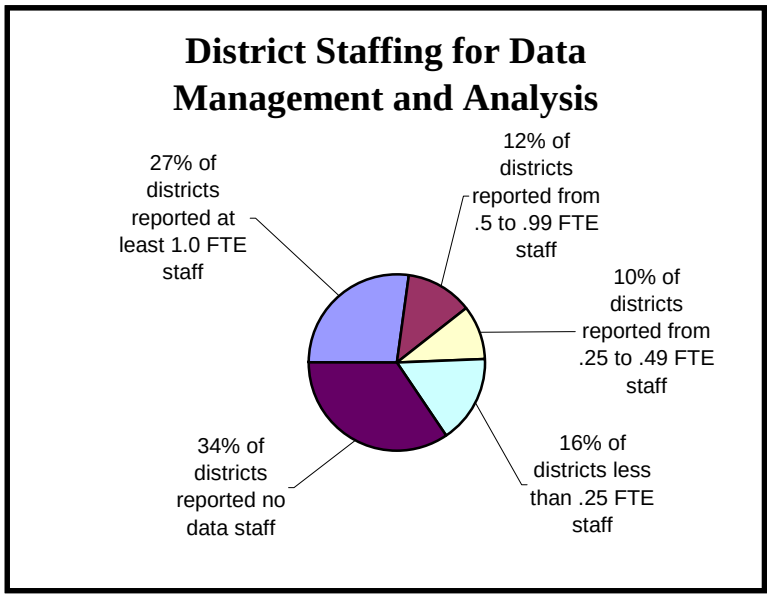


Districts' Turnaround Time for Technical Support	
Number of days to resolve a problem	**Percent of districts**
One day or less	27%
Between one and two days	29%
Between two and five days	33%
More than one week	11%

Data Management and Assessment

In order to use data effectively to improve instruction, it is necessary to have staff to collect, manage, and analyze the data. Staff are also needed to deal with the increasing local, state, and federal assessment and data reporting requirements. For these reasons, the Department's technology guidelines recommend that districts have a least one full-time person dedicated to data management and assessment. In 2005, 27% of districts

reported that they had met this guideline; when contracted services are counted, 29% of districts met the guideline.



District Staffing for Data Management and Analysis	
Level of staffing	**Percent of districts**
At least 1 FTE	27%
.5 to .99 FTE	12%
.25 to .49 FTE	10%
Less than .25 FTE	16%
No data staff	34%

Conclusion

A number of positive trends emerge from districts' 2004-2005 technology data. The daily use of technology in the classroom has increased, helping to make learning more relevant and engaging to today's students. In addition, greater numbers of teachers are using technology each day professionally outside the classroom as well, which increases their productivity, as well as their comfort level with technology. At the same time, teacher participation in technology professional development is up, and more teachers have moved into the proficient and advanced levels of technology using, enabling them to better help their students become technologically literate.

In spite of the progress made, challenges remain. One of the goals of No Child Left Behind is that all students become technologically literate by the end of eighth grade. However, as of June 2005, just 56% of eighth grade students had mastered the state's recommended instructional technology standards. In order to learn and maintain these technology skills, students need to have opportunities to use the skills as they learn the curriculum. Although many teachers are integrating technology into their instruction, an estimated 30% of teachers use technology with their students as infrequently as once a month or less, which is probably not sufficient to improve students' technology literacy.

District data on technology literacy and classroom use of computers highlight the need for more technology professional development. Even with the increased number of teachers participating in technology training over the past year, more than one-fifth of teachers remain at the beginner level in their ability to use computers. Moreover, even teachers who have higher levels of technology skills need help keeping up with the rapid developments in technology and new classroom applications. Increased professional development will help ensure that teachers will be able to use technology effectively in their teaching and help their students develop the technical skills they need.

Although achieving full technology integration and technology literacy for all teachers and students will require commitment and effort on the part of districts, the potential rewards are great. As the Partnership for 21st Century Skills states in its policymaker's guide, "Incorporating 21st century skills into education will make learning as relevant and invigorating in school as it is in [students'] lives outside of school, where many students already use the latest technologies to communicate, collaborate, work and learn."[27] In addition, the use of integrated data systems will empower educators to better meet students' learning needs so that all students can succeed academically.

With districts' ongoing efforts to provide the necessary infrastructure and support for technology, combined with educators' expertise in providing data-driven, technology-integrated instruction, Massachusetts students will be able to prepare themselves to meet the challenges of this new century.

---

[27] *The Road to 21st Century Learning: A Policymaker's Guide for 21st Century Skills*, Partnership for 21st Century Skills (2004) is available at http://www.21stcenturyskills.org/index.php?option=com_content&task=view&id=30&Itemid=32

Appendix A

Local Technology Plan Guidelines

(School Year 2004-2005 through 2006-2007)

In order to be eligible for E-Rate discounts, as well as federal and state technology funding, every school district is required to have a long-range strategic technology plan approved by the Department of Education. School districts must have their plans on file locally, including a full description of their implementation strategies. Each year, to approve school districts' technology plans, the Department asks districts to report on the progress they have made in implementing their plans through the Department's secure web portal.

In 2000, to help districts develop purposeful plans, the Department worked with technology stakeholders across the state to develop a set of recommended guidelines called "Local Technology Benchmark Standards for 2003." These guidelines represent recommended conditions for the effective integration of technology into instruction.

In 2001, the Board of Education established the Educational Technology Advisory Council (ETAC) to advise the Department on issues relating to the use of technology in schools. ETAC developed the School Technology and Readiness (STaR) Chart (http://www.doe.mass.edu/boe/sac/edtech/star.html) to illustrate the "complex set of interactions of people, materials and dimensions" that are involved in using technology effectively in schools. ETAC believes that the STaR Chart represents "the beginning of a new strategic plan for Massachusetts to improve student learning with the use of technology." Based on the recommendations of the STaR Chart and advice from stakeholders across the Commonwealth, the Department has developed this new set of guidelines for schools to use in technology planning. These guidelines are not *mandated* but rather recommended benchmarks[28] for districts to meet by the end of the school year 2006 to 2007. The Department will use these guidelines to gauge the progress of districts' implementation in order to approve their technology plans annually.

Recommended Benchmark 1
Commitment to a Clear Vision and Mission Statement

A. The district's technology plan contains a realistic and clearly stated set of goals and strategies that align with the district-wide school improvement plan. It is committed to achieving its vision by the end of the school year 2006-2007.

B. The district has a technology team with representatives from a variety of stakeholder groups. The technology team has the support of the district leadership team.

[28] The word benchmark in this document is defined as a reference point in the implementation of the local technology plan.

C. Budget

1. The district has a budget for its local technology plan with line items for technology in its operational budget.

2. The budget includes staffing, hardware, software, professional development, support, and contracted services.

3. The district leverages the use of federal, state, and private resources.

D. Evaluation

1. The district evaluates the effectiveness of technology resources toward attainment of educational goals on a regular basis. Prior to purchasing the district assesses the products and services that are needed to improve teaching and learning.

2. The district's technology plan includes an evaluation process that enables the district to monitor its progress in achieving its technology goals and to make mid-course corrections in response to new developments and opportunities as they arise.

Recommended Benchmark 2
Technology Integration

A. Teacher and Student Use of Technology

1. (a) Outside the Classroom
At least 85% of teachers use technology everyday, including some of the following areas: lesson planning, administrative tasks, communications, and collaboration. Teachers share information about technology uses with their colleagues.
(b) Within the Classroom
At least 85% of teachers use technology appropriately with students each week, including some of the following areas: research, multimedia, simulations, data interpretation, communications, and collaboration.

2. At least 85% of students from grades 5 to 8 show proficiency in all the Massachusetts Recommended PreK-12 Instructional Technology Standards for Grades 5 to 8.

3. At least 90% of teachers are working to meet the proficiency level in technology, and by the school year 2006-2007, 60% of teachers will have reached the proficiency level as defined by the Massachusetts Technology Self-Assessment Tool (TSAT).[29]

[29] TSAT is based on "Educational Technology Standards and Performance Indicators for All Teachers" (http://cnets.iste.org/teachers/t_stands.html) developed by National Educational Technology Standards (NETS), as well as the STaR Chart (http://www.doe.mass.edu/boe/sac/edtech/star.html) developed by the Educational Technology Advisory Council (ETAC).

4. The district has a CIPA-compliant Acceptable Use Policy (AUP) regarding Internet use.

B. Staffing

1. The district has a full-time equivalent (FTE) district-level technology director/coordinator.

2. The district provides one FTE instructional technology teacher per 40-80 instructional staff.

3. The district has one FTE person dedicated to data management and assessment.

Recommended Benchmark 3
Technology Professional Development

A. By the end of the school year 2006-2007, at least 85% of district staff will have participated in 45 hours of high-quality technology professional development covering technology skills and the integration of technology into instruction.

B. Technology professional development is sustained and ongoing and includes coaching, modeling best practices, district-based mentoring, and study groups. The professional development includes concepts of universal design and scientifically based, researched models.

C. Professional development planning includes an assessment of district and teachers' needs. The assessment is based on the competencies listed in the Massachusetts Technology Self-Assessment Tool.[30] The Department, the Educational Technology Advisory Council and stakeholders will review the levels of competencies in the Massachusetts Technology Self-Assessment Tool on an annual basis.

Recommended Benchmark 4
Accessibility of Technology

A. Students per Instructional Computer

1. The district has an average ratio of fewer than five students per high-capacity, Internet-connected computer. The Department will work with stakeholders to review the capacity of the computer on an annual basis. (The ultimate goal is to have a one-to-one, high-capacity, Internet-connected computer ratio.)

2. The district considers students' access to portable and/or handheld electronic devices appropriate to their grade level.

[30] Districts and teachers may use the TSAT online interactive application available on MassONE or a locally developed application.

3. The district has established a computer replacement cycle of six years or less.

B. Technical Support

1. The district makes a commitment to provide timely in-classroom technical support with clear information on how to access the support, so that technical problems will not cause major disruptions to curriculum delivery.

2. The district provides a FTE network administrator.

3. The district provides at least one FTE person to support 100-200 computers. Technical support can be provided by dedicated staff or contracted services.

Recommended Benchmark 5
Infrastructure for Connectivity

A. Internet Access

1. The district provides connectivity to the Internet in all classrooms in all schools, including wireless connectivity, if appropriate.

2. The district provides bandwidth of at least 10/100 MB to each classroom.

B. Networking (LAN/WAN)

1. The district provides a minimum 10/100 MB Cat 5 switched network and/or 802.11b/g wireless network.

2. The district provides services for secure file sharing, backups, scheduling, email, and web publishing, either internally or through contracted services.

C. E-Learning Environments

1. The district encourages the development and use of innovative strategies for delivering specialized courses through the use of technology.

2. The district deploys IP-based and/or ISDN-based connections for access to web-based and/or interactive video learning on the local, state, regional, national, and international level.

3. Classroom applications of e-learning include courses, cultural projects, virtual field trips, etc.

Recommended Benchmark 6
Access to the Internet outside the School Day

A. The district maintains an up-to-date web site that includes information for parents.

B. The district works with community groups to ensure that students and staff have access to the Internet outside of the school day.

C. The district web site includes an up-to-date list of places where students and staff can access the Internet after school hours.

Appendix B

District Statistics

Districts Reporting

School districts that reported on the implementation of their technology plans in 2005 are included in the following tables. Districts that did not do so are not included.

Student Computer Ratios

The ratio of students per Type A/B computer is based on the number of instructional computers of these types reported on the 2004 individual school profile forms. The ratio of students per computers of any type is based on the total number of instructional computers reported in all categories: Types A, B, and C. The enrollment figures used were those reported by the districts for the 2004-2005 school year. The ratios reported here are based on data aggregated from the school profile forms and validated by school districts. School districts should calculate a student computer ratio for each school to ensure equitable access across the entire district.

During the period that this data was collected, Type A computers were defined as "multimedia computers capable of running virtually all current software, including the latest high-end video and graphics programs" and having at least 256 RAM and a Pentium 4 processor or Macintosh G4 processor (or equivalent). Type B computers were defined as "multimedia computers capable of running most software except for the latest video and graphics programs" and having from 128 to 256 MB RAM and a Pentium 3 processor or Macintosh G3 processor (or equivalent). Type C computers were defined as multimedia computers capable of running most current productivity applications" and having less than 128 MB RAM and a Pentium 2 processor or a Macintosh PowerPC 604e processor (or equivalent).

Connections to the Internet

The percentage of classrooms connected to the Internet is based on reporting by individual schools on the school profile forms. Since some districts prefer to provide more connections in computer labs, the percentage of instructional computers connected to the Internet is also reported, using data from the school profile forms. This data was validated by school districts.

E-Rate

The information on which schools received E-rate discounts is based on data reported on the district profile form. This data was validated by school districts.

District Statistics

School district	Students per type A/B computer	Students per type A/B/C computer	Percent of classrooms connected to the Internet	Percent of instructional computers on the Internet	Did the district receive E-rate?
Abby Kelley Foster Charter	7.1	7.1	100	100	no
Abington	14.2	4.7	100	100	yes
Acton	8.2	5.1	100	93	yes
Acton-Boxborough	3.6	3.2	100	100	yes
Acushnet	1.9	1.7	100	98	yes
Adams-Cheshire	7.2	5.3	100	100	yes
Agawam	8.8	4.9	70	84	yes
Amesbury	7.9	3.7	100	93	yes
Amherst	3.3	3.3	100	100	yes
Amherst-Pelham	2.7	2.7	100	100	yes
Andover	5.7	2.7	100	98	yes
Arlington	4.9	3.9	100	100	yes
Ashburnham-Westminster	4.6	3.8	100	100	yes
Ashland	8.3	6.2	100	100	yes
Assabet Valley	2.2	2.2	42	97	yes
Athol-Royalston	3.3	2.7	90	80	yes
Attleboro	6.0	3.2	100	69	yes
Auburn	6.4	4.7	97	100	yes
Avon	2.7	2.7	100	90	yes
Ayer	5.1	3.5	100	100	yes
Barnstable	10.6	3.7	100	100	yes
Barnstable Horace Mann Charter	3.0	2.9	100	100	yes
Bedford	2.3	2.2	100	100	yes
Belchertown	4.2	4.2	87	90	yes
Bellingham	4.8	3.2	98	100	yes
Belmont	5.8	4.9	100	100	yes
Benjamin Banneker Charter	2.7	2.7	100	100	yes
Benjamin Franklin Classical Charter	4.4	3.9	100	100	no
Berkley	6.6	4.5	100	81	no
Berkshire Arts And Technology Charter	1.1	1.1	100	100	no
Berkshire Hills	6.0	4.1	100	91	yes
Berlin	11.7	4.4	100	100	yes
Berlin-Boylston	5.5	4.0	97	99	yes
Beverly	5.1	3.9	99	93	yes
Billerica	13.0	4.4	100	92	yes
Blackstone Valley Reg	1.7	1.6	100	100	yes
Blackstone-Millville	4.0	3.5	100	100	yes
Blue Hills Voc	1.9	1.7	100	100	yes
Boston	6.9	4.5	100	100	yes
Boston Collegiate Charter	8.4	8.4	100	100	no

District Statistics

School district	Students per type A/B computer	Students per type A/B/C computer	Percent of classrooms connected to the Internet	Percent of instructional computers on the Internet	Did the district receive E-rate?
Boston Renaissance Charter	3.2	3.2	100	87	yes
Bourne	2.9	2.4	100	100	yes
Boxborough	3.8	3.6	100	100	yes
Boxford	4.0	3.9	100	100	no
Boylston	3.4	3.2	100	91	yes
Braintree	9.0	6.2	61	86	yes
Brewster	3.8	2.3	100	100	no
Bridgewater-Raynham	5.7	5.3	100	100	no
Brimfield	6.3	3.7	100	33	yes
Bristol County Agr	3.8	2.9	100	100	no
Bristol-Plymouth Voc Tech	2.1	2.0	98	100	yes
Brockton	6.9	5.1	82	95	yes
Brookfield	10.0	3.7	100	86	yes
Brookline	2.8	2.8	99	100	yes
Burlington	4.2	2.8	99	88	yes
Cambridge	3.3	3.0	100	95	yes
Canton	2.8	2.4	100	100	no
Cape Cod Lighthouse Charter	3.1	3.1	92	95	no
Cape Cod Region Voc Tech	2.3	2.3	100	100	no
Carlisle	3.8	3.1	100	99	yes
Carver	6.2	4.6	100	100	yes
Central Berkshire	4.6	3.6	100	95	yes
Chatham	2.0	2.0	100	100	no
Chelmsford	4.0	3.7	100	100	yes
Chelsea	3.7	3.3	100	100	yes
Chesterfield-Goshen	4.2	4.2	100	100	yes
Chicopee	4.1	3.7	100	100	yes
Christa Mcauliffe Regional Charter	16.9	5.8	100	100	no
City On A Hill Charter	2.8	2.8	100	100	no
Clarksburg	4.2	4.2	100	100	yes
Clinton	4.1	2.4	100	100	yes
Codman Academy Charter	1.9	1.7	100	100	no
Cohasset	2.2	2.2	100	100	yes
Community Day Charter	4.9	4.9	100	100	no
Concord	2.7	2.7	100	100	yes
Concord-Carlisle	3.1	3.1	100	100	yes
Conway	4.6	4.2	100	100	yes
Danvers	6.2	5.5	100	99	yes
Dartmouth	4.6	3.0	100	100	yes
Dedham	2.8	2.8	100	100	yes

District Statistics

School district	Students per type A/B computer	Students per type A/B/C computer	Percent of classrooms connected to the Internet	Percent of instructional computers on the Internet	Did the district receive E-rate?
Deerfield	4.8	4.7	100	100	yes
Dennis-Yarmouth	6.0	4.0	100	90	yes
Douglas	3.1	2.8	100	100	yes
Dover	13.2	13.2	100	100	yes
Dover-Sherborn	17.6	17.6	100	100	yes
Dracut	5.4	4.0	100	100	yes
Dudley-Charlton Reg	4.4	3.3	100	100	no
Duxbury	4.0	3.3	100	100	yes
East Bridgewater	9.9	5.0	100	80	yes
East Longmeadow	4.4	2.8	100	100	yes
Eastham	2.8	2.8	100	100	no
Easthampton	5.4	4.3	78	85	yes
Easton	4.7	3.8	100	97	yes
Edgartown	2.5	2.0	100	94	yes
Edward Brooke Charter	8.9	8.9	100	88	no
Erving	2.0	2.0	100	100	yes
Essex Agr Tech	3.7	3.4	98	100	yes
Everett	3.3	3.1	83	100	yes
Fairhaven	10.5	4.8	73	100	no
Fall River	6.6	4.9	90	81	no
Falmouth	5.0	4.1	100	96	yes
Fitchburg	8.2	6.0	98	92	yes
Florida	3.5	3.4	100	100	yes
Foxboro Regional Charter	10.1	10.1	100	100	yes
Foxborough	2.9	2.6	100	78	yes
Framingham	3.2	2.9	100	100	yes
Francis W. Parker Charter Essential	3.8	3.8	100	100	yes
Franklin	5.4	3.1	100	100	yes
Franklin County	2.6	1.2	100	100	yes
Freetown	2.5	2.5	100	100	yes
Freetown-Lakeville	1.8	1.8	100	100	yes
Frontier	1.8	1.8	100	100	yes
Gardner	5.8	5.6	100	100	no
Gateway	1.8	1.7	100	100	yes
Georgetown	24.3	9.2	98	100	yes
Gill-Montague	2.7	2.7	99	100	yes
Gloucester	4.0	3.1	100	67	yes
Grafton	3.4	2.9	100	93	yes
Granby	8.4	5.0	100	100	no
Granville	2.6	2.6	100	100	yes

District Statistics

School district	Students per type A/B computer	Students per type A/B/C computer	Percent of classrooms connected to the Internet	Percent of instructional computers on the Internet	Did the district receive E-rate?
Greater Fall River	2.1	1.8	100	93	yes
Greater Lawrence Rvt	2.5	2.2	100	100	yes
Greater Lowell Voc Tec	2.9	2.5	97	97	yes
Greater New Bedford	2.0	2.0	100	100	yes
Greenfield	3.8	3.8	100	100	yes
Groton-Dunstable	3.8	3.1	100	100	yes
Hadley	3.9	3.2	100	100	yes
Halifax	6.7	5.5	100	53	no
Hamilton-Wenham	6.3	4.1	100	100	yes
Hampden-Wilbraham	5.2	3.7	100	100	yes
Hampshire	1.9	1.9	100	100	yes
Hancock	2.8	2.8	100	89	NA
Hanover	4.2	2.9	100	97	yes
Harvard	4.8	3.7	100	100	yes
Harwich	4.0	3.3	100	95	yes
Hatfield	3.3	3.3	100	100	no
Haverhill	18.1	8.3	85	100	no
Hawlemont	1.9	1.9	100	100	yes
Health Careers Academy Charter	6.9	6.9	100	100	no
Hill View Montessori Charter	8.1	8.1	100	40	no
Hingham	5.3	4.0	100	86	yes
Holbrook	5.5	5.1	100	96	yes
Holland	4.4	2.6	100	96	yes
Holliston	3.3	2.3	100	100	yes
Holyoke	6.1	4.2	100	100	yes
Hopedale	3.8	3.8	100	100	yes
Hopkinton	3.2	3.0	100	99	yes
Hudson	3.1	2.8	100	100	yes
Hull	3.0	3.0	100	99	no
Ipswich	3.0	2.9	100	100	yes
King Philip	4.3	2.9	100	98	yes
Kingston	4.2	3.6	100	48	yes
Lakeville	6.0	4.5	100	91	yes
Lanesborough	4.5	4.5	100	100	NA
Lawrence	3.4	3.4	76	100	yes
Lawrence Family Development Charter	6.0	4.0	100	98	no
Lee	1.9	1.9	100	100	yes
Leicester	4.2	3.7	100	100	yes
Lenox	5.5	3.4	100	80	yes
Leominster	4.1	3.5	100	89	yes

District Statistics

School district	Students per type A/B computer	Students per type A/B/C computer	Percent of classrooms connected to the Internet	Percent of instructional computers on the Internet	Did the district receive E-rate?
Leverett	2.2	2.1	100	100	yes
Lexington	4.8	4.2	99	100	yes
Lincoln-Sudbury	1.3	1.3	100	100	no
Littleton	4.0	2.6	98	63	yes
Longmeadow	3.4	3.1	100	100	yes
Lowell	8.1	3.0	100	68	yes
Lowell Community Charter	4.4	4.3	100	100	yes
Lowell Middlesex Academy Charter	20.0	20.0	100	100	no
Ludlow	6.1	5.1	100	94	yes
Lunenburg	5.5	4.9	100	100	yes
Lynn	5.9	4.1	88	86	yes
Lynnfield	2.3	2.3	100	99	no
Malden	3.1	2.8	100	100	yes
Manchester Essex Regional	2.9	2.9	100	96	yes
Mansfield	10.8	6.4	100	100	yes
Marblehead	3.9	3.2	100	100	yes
Marion	3.5	3.5	100	100	yes
Marshfield	5.1	5.0	100	98	yes
Marstons Mills E. Horace Mann Charter	6.2	3.6	100	65	yes
Marthas Vineyard	2.0	1.7	100	93	yes
Masconomet	2.3	2.3	100	100	yes
Mashpee	8.5	7.6	100	100	yes
Mattapoisett	1.9	1.9	100	88	yes
Maynard	20.9	3.2	100	100	yes
Medfield	9.2	6.6	100	100	yes
Medford	2.3	2.2	98	99	yes
Media And Technology Charter	1.8	1.8	100	100	yes
Medway	4.5	2.9	100	97	yes
Mendon-Upton	6.5	4.4	100	100	yes
Methuen	8.8	3.2	100	100	yes
Middleborough	4.0	2.8	100	100	yes
Middleton	11.9	5.3	98	69	no
Milford	7.4	5.9	83	82	yes
Millbury	4.6	4.5	100	100	yes
Millis	3.7	3.7	100	100	yes
Milton	3.7	3.6	100	98	yes
Minuteman Voc Tech	1.7	1.3	100	100	yes
Mohawk Trail	6.1	3.5	100	98	yes
Monson	2.9	2.9	100	100	yes
Montachusett Voc Tech Reg	2.5	2.2	NA	100	yes

District Statistics

School district	Students per type A/B computer	Students per type A/B/C computer	Percent of classrooms connected to the Internet	Percent of instructional computers on the Internet	Did the district receive E-rate?
Murdoch Middle Charter	1.7	1.6	100	93	no
Nahant	3.4	2.9	100	92	no
Narragansett	9.0	4.8	97	100	yes
Nashoba	2.7	2.2	100	100	yes
Nashoba Valley Tech	4.4	2.1	100	100	yes
Natick	3.6	3.4	100	100	yes
Nauset	8.9	3.6	100	98	no
Needham	3.4	3.4	100	99	yes
Neighborhood House Charter	9.7	9.7	100	100	no
New Bedford	4.0	3.2	91	86	yes
New Bedford Global Learning Charter	1.0	1.0	100	100	no
New Salem-Wendell	4.1	3.7	100	100	yes
Newburyport	3.6	2.6	100	100	yes
Newton	4.5	3.6	98	78	yes
Norfolk	6.2	4.2	100	100	yes
Norfolk County Agr	2.1	2.1	100	100	yes
North Adams	4.3	3.6	100	99	no
North Andover	3.3	2.8	100	100	no
North Attleborough	5.5	3.5	100	100	yes
North Brookfield	1.7	1.5	100	100	yes
North Central Charter Essential	2.6	2.6	100	100	no
North Middlesex	5.7	4.6	100	96	yes
North Reading	4.4	4.0	98	98	yes
North Shore Reg Voc	1.6	1.6	100	95	yes
Northampton	7.2	5.0	100	100	yes
Northampton-Smith	2.5	2.3	100	100	no
Northboro-Southboro	7.4	3.8	100	100	yes
Northborough	5.6	3.1	100	98	yes
Northbridge	3.5	2.8	99	100	yes
Northeast Metro Voc	3.5	3.5	94	100	no
Northern Berkshire Voc	1.5	1.5	100	100	yes
Norton	9.3	3.8	100	100	yes
Norwell	2.7	2.1	100	100	yes
Norwood	5.7	5.7	100	100	yes
Oak Bluffs	3.3	3.3	100	100	yes
Old Colony Reg Voc Tech	3.8	2.6	100	100	no
Old Rochester	2.1	2.0	100	100	yes
Orange	1.7	1.6	100	100	yes
Orleans	3.6	3.5	100	100	no
Oxford	4.5	4.5	100	100	yes

District Statistics

School district	Students per type A/B computer	Students per type A/B/C computer	Percent of classrooms connected to the Internet	Percent of instructional computers on the Internet	Did the district receive E-rate?
Palmer	7.5	4.3	100	99	yes
Pathfinder Voc Tech	2.2	2.2	100	98	yes
Peabody	7.0	4.3	94	95	yes
Pelham	1.4	1.3	100	100	yes
Pembroke	4.6	3.9	100	100	yes
Pentucket	8.3	5.3	100	100	no
Petersham	2.9	2.8	86	95	no
Pioneer Valley	2.3	2.3	95	100	yes
Pioneer Valley Performing Arts Charter	6.7	6.7	94	87	yes
Pittsfield	4.3	4.3	100	97	yes
Plainville	2.0	2.0	100	96	yes
Plymouth	5.5	2.3	100	100	yes
Plympton	2.7	2.7	100	100	yes
Prospect Hill Academy Charter	7.0	7.0	100	100	no
Provincetown	1.8	1.2	100	100	yes
Quabbin	8.1	6.4	100	100	no
Quaboag Regional	3.7	3.0	96	92	yes
Quincy	4.6	3.5	100	100	yes
Ralph C Mahar	1.8	1.8	100	100	yes
Randolph	16.8	4.3	100	96	yes
Reading	8.6	7.0	100	90	no
Revere	3.1	3.1	100	100	yes
Richmond	3.8	3.3	96	100	no
Rising Tide Charter	3.6	3.2	100	100	yes
River Valley Charter	7.0	5.4	100	100	no
Robert M. Hughes Academy Charter	4.5	3.3	100	18	no
Rochester	4.2	3.4	100	90	yes
Rockland	7.3	3.3	100	100	yes
Rockport	3.6	3.1	100	90	yes
Rowe	2.4	1.4	NA	100	yes
Roxbury Preparatory Charter	4.6	4.6	100	100	yes
Sabis International Charter	15.8	14.2	27	98	no
Salem	3.4	2.7	78	72	yes
Salem Academy Charter	3.8	1.6	100	100	no
Sandwich	4.9	4.3	100	100	yes
Saugus	12.2	5.7	100	100	yes
Savoy	2.6	2.6	83	100	yes
Scituate	4.1	3.7	100	100	yes
Seekonk	3.2	2.6	100	100	yes
Seven Hills Charter	2.4	2.4	100	94	yes

District Statistics

School district	Students per type A/B computer	Students per type A/B/C computer	Percent of classrooms connected to the Internet	Percent of instructional computers on the Internet	Did the district receive E-rate?
Sharon	4.2	4.0	100	100	yes
Shawsheen Valley Voc Tech	2.2	2.0	100	100	no
Sherborn	18.7	18.7	100	100	yes
Shirley	4.3	3.1	99	86	yes
Shrewsbury	3.4	3.1	100	100	no
Shutesbury	3.0	2.8	100	100	yes
Silver Lake	4.5	2.8	100	100	yes
Smith Leadership Academy Charter	7.6	7.6	100	100	no
So Middlesex Voc Tech Reg	2.1	1.9	98	92	yes
Somerset	5.0	3.9	100	100	yes
Somerville	3.5	2.5	100	97	yes
South Hadley	4.5	4.4	86	96	no
South Shore Charter	3.1	3.1	100	100	no
South Shore Reg Voc Tech	2.5	2.5	100	100	yes
Southampton	9.2	7.1	100	100	yes
Southborough	3.7	2.4	100	99	yes
Southbridge	8.2	4.8	100	73	yes
Southeastern Reg Voc Tech	1.4	1.4	100	97	yes
Southern Berkshire	2.1	2.1	100	100	yes
Southern Worcester Cty Vt	4.2	2.5	100	95	yes
Southwick-Tolland	8.8	4.7	98	99	yes
Spencer-E Brookfield	4.1	2.8	100	100	yes
Springfield	4.3	2.8	82	81	yes
Stoneham	4.0	4.0	100	100	yes
Stoughton	2.8	2.8	100	100	yes
Sturbridge	7.1	4.9	100	100	yes
Sudbury	3.4	3.3	100	100	yes
Sunderland	4.2	4.2	100	100	yes
Sutton	3.5	2.0	100	100	yes
Swampscott	1.6	1.6	100	100	yes
Swansea	5.0	4.3	100	100	yes
Tantasqua	3.5	3.0	92	92	yes
Taunton	3.1	2.8	100	98	yes
Tewksbury	7.3	3.8	100	100	yes
Tisbury	2.3	2.2	100	100	yes
Topsfield	4.1	3.1	100	100	no
Tri County	4.8	1.8	100	100	yes
Triton	5.0	3.6	100	96	yes
Truro	2.1	2.1	100	98	no
Tyngsborough	4.1	3.0	100	98	yes

District Statistics

School district	Students per type A/B computer	Students per type A/B/C computer	Percent of classrooms connected to the Internet	Percent of instructional computers on the Internet	Did the district receive E-rate?
Up-Island Regional	1.8	1.8	100	100	yes
Upper Cape Cod Voc Tech	1.7	1.7	100	100	yes
Uxbridge	4.5	4.3	100	100	yes
Wachusett	3.7	2.9	100	100	yes
Wakefield	5.7	5.7	100	100	yes
Wales	4.7	3.4	100	100	yes
Walpole	3.1	2.7	87	84	yes
Waltham	4.5	4.1	79	95	yes
Ware	3.8	2.7	100	100	yes
Wareham	5.6	3.7	100	100	yes
Watertown	3.2	2.4	100	100	no
Wayland	3.3	3.0	92	90	yes
Webster	5.0	4.9	65	59	yes
Wellesley	3.1	3.1	100	100	yes
Wellfleet	2.3	1.7	100	100	no
West Boylston	5.8	2.3	100	100	yes
West Bridgewater	4.0	3.9	100	97	no
West Springfield	4.3	3.3	100	69	no
Westborough	3.1	2.7	100	100	yes
Westfield	5.4	3.1	99	99	yes
Westford	3.8	3.4	100	99	yes
Westhampton	4.3	4.2	100	89	yes
Weston	3.2	2.3	100	100	yes
Westport	4.3	4.0	100	100	yes
Westwood	3.2	3.0	100	100	yes
Weymouth	3.9	3.8	99	99	yes
Whately	2.5	2.5	100	100	yes
Whitman-Hanson	3.6	3.6	100	100	yes
Whittier Voc	2.1	1.8	100	100	yes
Williamsburg	2.8	2.8	100	95	yes
Williamstown	2.9	2.9	100	100	no
Wilmington	4.4	4.3	100	100	yes
Winchendon	24.7	5.0	100	99	yes
Winchester	5.5	4.8	100	92	yes
Winthrop	3.8	3.8	100	99	no
Woburn	3.4	3.3	100	100	yes
Worcester	3.5	3.5	100	100	yes
Wrentham	2.0	1.9	100	100	yes